

This is a response to the Final Office Action mailed on October 9, 2007.

Claims 1-12 stand rejected.

Claims 1, 6, 7, and 12 have been amended; no new matter has been added.

Claim 13 has been newly added without the introduction of new matter.

Claims 1-13 are currently pending.

Amendments to the Specification

The paragraph beginning on page 5, line 34 of the specification has been amended such that the tubular body is described as having “circumferential gores.” The Brazilian priority document, on page 5, refers to the feature as “gomos circunferenciais.” Accordingly, Applicant has amended to specification to provide a more accurate translation the structure described in the Brazilian priority document. No new matter is added.

Claim Rejections -- 35 U.S.C. § 102

Claims 1-2, 5-6, and 11-12 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,174,141 to Song et al. (“Song”). Applicants respectfully traverse.

Song discloses a structure for coupling a muffler for a linear compressor. A first spring 231 is disposed between an inner surface of cover 10 and an outer surface of a piston 19. A second spring 232 is disposed between an inner surface of the piston 19 and a surface of the inner lamination 6. (col. 6, ll. 62-66; and Fig. 8). As can be seen in Fig. 8, the springs 231 and 232 are coil springs having gaps between the turns of the coil wire.

In contrast, amended claim 1 recites “spring means [that] presents an elongated tubular body . . . and has an end operatively coupled to the actuating means and an opposite end operatively coupled to the non-resonant assembly, said tubular body providing a tubular wall extending from the end operatively coupled to the actuating means to the opposite end.” Song fails to disclose this arrangement because Song discloses a coil spring and, as can be seen in Fig. 8, there are significant gaps between the coils of the spring. Thus, Song fails to disclose a “tubular body providing a tubular wall extending from the end operatively coupled to the actuating means to the opposite end” as recited by amended claim 1.

Further, claim 1 calls for the “tubular body having at least part of the extension thereof folded in circumferential sectors that are symmetric in relation to the axis of said tubular body.” Song fails to disclose an extension folded in circumferential sectors. Rather, Song discloses a coil spring 232. As can best be seen in Fig 8, which shows a cross-sectional view of the spring 232, shows what appears to be the wire of the spring 232 with gaps in between the coils of wire. There are no extensions folded in circumferential sectors. There is no folding, but rather the cross-sectional view appears to show the wire coils are inline in an axial direction of the spring 232. Thus, Song fails to disclose “said tubular body having at least part of the extension thereof folded in circumferential sectors that are symmetric in relation to the axis of said tubular body.”

Accordingly, Song fails to disclose each and every element of amended claim 1. Claims 2, 5, 6, 11, and 12 depended, either directly or indirectly, from independent claim 1 and therefore are allowable for at least this reason. Therefore, Applicants respectfully request withdrawal of the rejection of claims 1, 2, 5, 6, 11, and 12.

Amended claim 6 recites that the “tubular body providing the tubular wall presents a non-hollow lateral surface extending from the end operatively coupled to the actuating means to the opposite end.” As discussed above, there are gaps between the wire coils that form the spring 232 disclosed by Song. Because the spring disclosed by Song has these gaps, Song fails to disclose a

“tubular body providing the tubular wall presents a non-hollow lateral surface extending from the end operatively coupled to the actuating means to the opposite end,” as called for by amended claim 6. Accordingly, Song fails to disclose each and every element of claim 6 and claim 6 is not anticipated by Song for at least this additional reason.

Claim 11 recites that the “tubular body has an end hermetically affixed to the cylinder and the opposite end hermetically affixed to the actuating means, in order to block the fluid communication between the compression chamber and the exterior of the cylinder through gaps existing between the piston and the cylinder.” Song fails to disclose that the spring 232 that has an end and an opposite end hermetically affixed. Further, as discussed above, there are gaps between the wire coils that form the spring 232 disclosed by Song. The spring disclosed by Song cannot block fluid communication because fluid communication would be possible through the gaps in the spring. Accordingly, Song fails to disclose each and every element of claim 11 and claim 11 is not anticipated by Song for at least this additional reason.

Claim 12 recites that “the hermetic compressor comprises a hermetic shell, inside which are mounted the resonant and the non-resonant assemblies, wherein it comprises another spring means . . . having an end affixed to the actuating means *and the other end affixed to the shell.*” (Emphasis added). Song discloses a linear compressor with a hermitic container 1 and a cover 10 disposed inside the hermetic container. (Col. , ll. 45-50). As can clearly be seen in Fig. 8, the spring 231 is disposed between an inner surface of cover 10 and an outer surface of piston 19. (Col. 6, ll. 62-64). The spring 231 is not affixed to the hermetic container 1. Thus, Song fails to disclose another spring means having an end affixed to the actuating means *and the other end affixed to the hermitic shell.* Accordingly, Applicants respectfully request withdrawal of the rejection.

Claim Rejections -- 35 U.S.C. § 103

Claims 4-5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Song in view of U.S. Patent No. 6,345,963 to Thomin et al. ("Thomin"). Applicant notes that there appears to be a typographical error in the Office Action, and based on the language in the rejection, it seems the Examiner intended to address claims 3-4. Applicants respectfully traverse the rejection.

The Examiner admits that Song fails to teach "each circumferential sector present[ing] a substantially "V" shaped profile, each circumferential sector being elastically deformed by variation of its respective dihedral angle," as recited in claim 3 or that "the circumferential sectors present the same dihedral angle," as recited in claim 4. The Examiner contends that Thomin's disclosure of pumping bellows teaches these features and that Thomin represents evidence that a pumping bellows disclosed by Thomin and a spring were art-recognized equivalent structures for resonant assemblies. Applicants respectfully disagree.

Song discloses a structure for coupling a muffler for a linear compressor. A piston 19 reciprocates inside a cylinder 4 and gas is compressed inside a compression space P by cylinder 19. Song discloses an elastic support member 230 that includes a first spring 231 and a second spring 232. The elastic support member 230 having springs 231 and 232 supports coupling portions for mufflers so that the mufflers are fixed to the piston. (col. 7, ll. 8-20).

In contrast, Thomin discloses a pump that includes a cylinder 6 that contains deformable pumping bellows 12. The pumping bellows 12 separate two pumping chambers 10 and 11. Thus, the bellows 12 disposed in cylinder 6 are pumping bellow that pump a heat transfer fluid. Thomin discloses that the pumping bellows 12 are formed from stacked Belleville washers and that "the greater number of folds 18 [of the pumping bellows 12], the lower the resilient flexure stresses with stood by each fold 18 (for a specific nominal flow rate value and size)." (col. 7, ll. 20-23). However, Thomin fails to teach that a pumping bellows is an equivalent structure to a supporting spring that fixes one component to another. Accordingly, Applicants submit that Thomin does not

teach that a pumping bellows can be substituted for or is an equivalent structure to a supporting spring that fixes one component to another. Thus, Applicants respectfully request withdrawal of the rejection.

Claims 7 and 11 are rejected under U.S.C. § 103(a) as being unpatentable over Song in view of Thomin. Applicants respectfully traverse.

Amended claim 7 recites the “fixation of each end of the tubular body to the adjacent part defined by the cylinder and the actuating means is obtained by one of the processes of welding, gluing and screwing.” The Examiner admits that Song fails to disclose the fixation of each end of spring 232 by one of the processes of welding, gluing and screwing. The Examiner contends that it would have been obvious in view of Thomin to fix each end of spring 232 by one of the processes of welding, gluing and screwing. The Applicants respectfully disagree.

In one embodiment, Song discloses that the first and second springs “each have its one end fixed to both surfaces of the piston 19, respectively, for thereby becoming integral with the piston 19, and its another end *loosely* supported by the first and second spring support members 123 and 124, respectively.” (Col. 6, ll. 25-31) (Emphasis added). According to Song with this arrangement, “[t]herefore, a predetermined variation does not occur in the radial directions of the first and second springs.” (Col. 6, ll. 24-35). In another embodiment, Song also discloses first and second springs 231 and 232 that each have end portions fixed and other end portions *loosely* fixed. (Col. 6, ln. 62 thru Col. 7, ln. 2) (Emphasis added). Applicants submit that it is improper to combine Thomin, which discloses the attachment of pumping bellows to form pumping chambers, in contradiction to the teaching of Song that one end of first and second springs is fixed and another end of the springs is *loosely* fixed so that a predetermined variation does not occur in the radial directions of the first and second springs. Accordingly, Applicants respectfully request withdrawal of the rejection of claim 7.

Claim 11 recites:

the tubular body has an end hermetically affixed to the cylinder and the opposite end hermetically affixed to the actuating means, in order to block the fluid communication between the compression chamber and the exterior of the cylinder through gaps existing between the piston and the cylinder.

The Examiner cites element 19a of piston 19 as providing a seal between a compression space P and an area surrounding cylinder 4. Applicants submits that a formation on the piston is irrelevant to claim 11, which recites that “*the tubular body has an end hermetically affixed to the cylinder and the opposite end hermetically affixed to the actuating means, in order to block the fluid communication . . .*” Claim 11 is concerned with the tubular body. Further, Applicants submit that piston 19 and therefore formation 19a of piston 19 reciprocates inside and moves with respect to cylinder 4, and therefore there may be some leakage between these moving parts and the piston 19 is not *hermitically affixed* to the cylinder 4. Accordingly, formation 19a on piston 19 disclosed by Song is irrelevant to claim 11.

Further, as stated above with respect to claim 7, Song discloses that the first and second springs “each have its one end fixed to both surfaces of the piston 19, respectively, for thereby becoming integral with the piston 19, and its another end *loosely* supported by the first and second spring support members 123 and 124, respectively.” (Col. 6, ll. 25-31) (Emphasis added). According to Song with this arrangement, “[t]herefore, a predetermined variation does not occur in the radial directions of the first and second springs.” (Col. 6, ll. 24-35). In another embodiment, Song discloses first and second springs 231 and 232 that each have end portions fixed and other end portions *loosely* fixed. (Col. 6, ln. 62 thru Col. 7, ln. 2) (Emphasis added). Applicants submit that it is improper to combine Thomin, which discloses the attachment of pumping bellows to form pumping chambers, in contradiction to the teaching of Song that one end of first and second springs is fixed and another end of the springs is *loosely* fixed so that a predetermined variation does not occur in the radial directions of the first and second springs. Accordingly, Applicants respectfully request withdrawal of the rejection of claim 11.


Claims 8-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Song in view of Thomin as applied to claim 7 above, and further in view of U.S. Patent No. 6,485,267 to Imai et al. (“Imai”).

Claims 8-10 depend, either directly or indirectly, from claim 7. As discussed above with respect to claim 7, Song discloses that the first and second springs each have one end portion *loosely* fixed. (Col. 6, ln. 62 thru Col. 7, ln. 2) (Emphasis added).

Thomin discloses the attachment of pumping bellows 12. Imai discloses a control valve that includes bellows 146 that are disposed within a pressure sensitive chamber 145a, wherein the bellows 146 shrinks in response to an increase in suction pressure of the pressure sensitive chamber 145a. Applicants submit that it is improper to combine Thomin, which discloses the attachment of pumping bellows to form pumping chambers, and Imai, which includes pressure responsive bellows, in contradiction to the teaching of Song that one end of first and second springs is fixed and another end of the springs is *loosely* fixed so that a predetermined variation does not occur in the radial directions of the first and second springs. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 8-10.

Further, Examiner relies on stopper 147 and stopper 148 as disclosing a circumferential tooth and contends that it would have been obvious to modify Song in view of Imai. The stoppers 147 and 148 are designed to contact in order to restrict displacement of the bellows 146. (Col. 7, ll. 50-55). As can be seen in Fig. 3 of Imai, the solid stoppers are designed to contact end to end to restrict movement. Accordingly, Applicants submits that modifying the linear compressor of Song to include the stoppers 147 and 148 of Imai would interfere with the operation of the Song compressor. As shown in Fig. 8 of Song, the piston 19, the muffler 210, and intake passage are concentrically located within the spring 232. Inclusion of the stoppers 147 and 148 would displace the piston, muffler, and intake passage. Further, contact between stoppers 147 and 148 during reciprocation of the piston would likely interfere with the operation of linear compressor disclosed by Song. Thus, Applicant submits that it would not have been obvious to modify the linear


New Claim

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Each and every point raised in the Office Action dated October 9, 2007 has been addressed on the basis of the above amendments and remarks. In view of the foregoing it is believed that claims 1-13 are in condition for allowance and it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

Dated: February 11, 2008

By 
Louis J. DelJuidice
Registration No.: 47,522
DARBY & DARBY P.C.
P.O. Box 770
Church Street Station
New York, New York 10008-0770
(212) 527-7700
(212) 527-7701 (Fax)
Attorneys/Agents For Applicant